

LIQUID CLEANER DISPENSER FOR TOILET

FIELD OF THE INVENTION

The present invention relates to toilet cleaning devices and more particularly
5 to a liquid cleaner dispenser mounted in a toilet tank with improved characteristics.

BACKGROUND OF THE INVENTION

Conventionally, toilet cleaning is not a job that everybody likes to do. Also,
10 unpleasant toilet odor is strong if not sufficient cleaning is done. As such, a wide variety of cleaners have been developed by cleaner manufacturing companies. The cleaners are adapted to remove dirt or the like from toilet bowl. Further, such cleaners are available to enable a user easily clean toilet. It is known that a laboring cleaning of toilet by using cleaner may cause dirty water to spill over a
15 user. This is not desirable. It is also known dirt can be easily formed after a period of time since a previous cleaning. Hence, a cleaning per use is required. This is a tedious job. As a solution to the above drawback, solid cleaners shaped as blocks (e.g., cleaning blocks) have been developed by cleaner manufacturing companies. The cleaning block has ingredients of cleaner and deodorant. The
20 cleaning block can be directly thrown into a toilet tank to dissolve. As a result, water is mixed with the dissolved cleaning block to form a cleaning solution. After using toilet, a person can flush defecation and/or urination with the cleaning solution stored in the toilet tank. As an end, dirt is not easy to accumulate on a toilet bowl.

25 However, amount of the cleaning block dissolved in the toilet tank may reduce gradually as time passes. Also, amount of the cleaning block mixed with water at one period of time may be different from that at another period of time

(e.g., either longer or shorter). Hence, it is typical that one flushing having excessive amount of dissolved cleaning block can sufficiently clean toilet and fill the rest room with a fragrant odor with the expense of wasting portions of the cleaning block. To the contrary, a desired cleaning cannot be achieved if amount
5 of the cleaning block dissolved in the toilet tank is not sufficient.

Moreover, it is found that the cleaning block can be sufficiently mixed with water in the toilet tank after a predetermined period of time since a previous water refilling. However, no sufficient dissolution of the cleaning block in water is made after the predetermined period of time (i.e., no water refilled) even the
10 cleaning block is still dissolving. Hence, large concentrations of cleaner and deodorant exist on the bottom of toilet tank. As a result, dirt can be easily removed by flushing water contained the dissolved cleaner while leaving small concentration of deodorant. As such, an effective time of the remaining deodorant is limited after flushing.

15 Thus, it is desirable to provide an improved liquid cleaner dispenser in toilet in which the dispenser is able to dispense a fixed amount of liquid cleaner in a toilet tank, i.e., irrespective of different time intervals between any two continual times of flushing, for a flushing thereafter.

20 SUMMARY OF THE INVENTION

One object of the present invention is to provide a dispensing device comprising a dispenser for storing liquid cleaner, the dispenser comprising an upper channel and a bottom opening; a connecting cup extended downward from the dispenser, the connecting cup including at least one aperture on a
25 bottom thereof; and a float in the connecting cup opposite the bottom opening. The dispenser is mounted in a toilet tank. The float is adapted to either engage with or move away from the bottom opening as the water level in the toilet tank

risers or falls. As such, the dispenser is adapted to automatically dispense liquid cleaner to the toilet tank or stop dispensing liquid cleaner to the toilet tank as the float falls or rises. As a result, a fixed amount of liquid cleaner is dispensed to the toilet tank to be fully mixed with water in the toilet tank.

5 Another object of the present invention is to provide a small, enclosed dispenser in the toilet tank, a large container outside the toilet tank, the container being adapted to store liquid cleaner, and a flexible tube interconnected the container or a top opening of the dispenser and the toilet tank. As such, fluid level of the toilet tank is perpendicular to the dispenser by bending the flexible
10 tube. Also, the dispenser is suitably disposed in the toilet tank. A vent hole is formed on the container for communicating with outside. Hence, inside and outside pressures of the container will be in equilibrium by the provision of vent hole. Further, liquid cleaner in the container will flow into the dispenser via the flexible tube by its own weight. The dispenser is provided to suspend in the toilet
15 tank due to the following reasons: There is a water saving device installed in the toilet tank, resulting in an insufficient space for mounting a large container therein. Alternatively, inner wall of the toilet tank is inclined or curve, resulting in a difficulty of mounting the dispenser in the toilet tank. Still alternatively, a user does not want to be bothered by frequently removing the dispenser from the
20 toilet tank for liquid cleaner refilling.

 Still another object of the present invention is to provide a rail longitudinally disposed on an inner wall of the dispenser, an inverted U-shaped hoist rope slidable on the rail, an upper depressible spring detent on an outer surface of the dispenser facing the rail and being coupled to an inner end of the hoist rope, and
25 a holed member having a plurality of apertures along the rail, any one of the apertures being adapted to lock the depressible spring detent when the hoist rope slides along the rail. As such, the dispenser is suspended in the vertically

disposed toilet tank by means of the hoist rope. Also, it is possible of changing a relative positioning of the dispenser in the toilet tank and controlling amount of liquid cleaner dispensed to the toilet tank. In other words, a user can adjust amount of liquid cleaner dispensed to the toilet tank as desired.

- 5 The above and other objects, features and advantages of the present invention will become apparent from the following detailed description taken with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

- 10 FIG. 1 is a cross-sectional view of a first preferred embodiment of liquid cleaner dispenser mounted in a toilet tank according to the invention; and

FIG. 2 is a cross-sectional view of a second preferred embodiment of liquid cleaner dispenser mounted in a toilet tank according to the invention.

15 DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

- Referring to FIGS. 1 and 2, there is shown a liquid cleaner dispenser 1 mounted in a toilet tank 3 of toilet in accordance with the invention. As designed, fluid is automatically refilled into the tank 3 after flushing. Solution (e.g., liquid cleaner) is stored in the dispenser 1. The dispenser 1 comprises an upper
- 20 channel 10 for refilling solution, a bottom opening 12, a connecting cup 16 extended downward in which a bottom of the connecting cup 16 is spaced from the bottom opening 12 by a predetermined distance and the connecting cup 16 includes at least one aperture 162 on the bottom. The dispenser 1 further comprises a float 2 in the connecting cup 16 opposite the bottom opening 12.
- 25 The float 2 is floated in the connecting cup 16 to be disengaged from the bottom opening 12 for enabling solution in the dispenser 1 to flow out of the bottom opening 12 when a fluid level in the tank 3 is lower than the bottom opening 12.

The float 2 will also rise to engage with the bottom opening 12 as the fluid level in the tank 3 continues to rise. Eventually, the bottom opening 12 is closed by the float 2 to stop fluid in the dispenser 1 flowing out of the bottom opening 12. In brief, the dispenser 1 is adapted to automatically dispense solution to the tank 3 or stop dispensing solution to the tank 3. Also, fluid is continuously refilling the tank 3 during the process of dispensing solution to the tank 3. Hence, refilled fluid (e.g., water) continuously mixes with the solution in the tank 3. As a result, water and solution are sufficiently mixed.

Referring to FIG. 1, in a first preferred embodiment of the invention a small, enclosed dispenser 1 is mounted in the tank 3. The dispenser 1 is provided due to the following reasons: There is a water saving device installed in the tank 3, resulting in an insufficient space for mounting a large container therein. Alternatively, inner wall of the tank 3 is inclined or curve, resulting in a difficulty of mounting the dispenser 1 in the tank 3. Still alternatively, a user does not want to be bothered by frequently removing the dispenser 1 from the tank 3 for solution refilling. An opening 142 is formed on a side or top (as shown) of the dispenser 1. A flexible tube 4 has one end coupled to the top opening 142 and the other end coupled to a large container 5 on top of the tank 3. The container 5 is adapted to store solution. The container 5 comprises a top vent hole 52 for communicating with outside. As such, fluid level of the tank 3 is perpendicular to the dispenser 1 by bending the flexible tube 4. Also, the dispenser 1 is suitably disposed in the tank 3. Inside and outside pressures of the container 5 will be in equilibrium by the provision of vent hole 52. Further, solution in the container 5 will flow into the dispenser 1 via the flexible tube 4 by its own weight.

In the preferred embodiment, the container 5 further comprises an open casing 54, a top cover 56 for enclosing the open casing 54 opposite the tank 3, and a side opening 58 bordered a bottom, the side opening 58 being coupled to

the flexible tube 4. Also, the vent hole 52 is disposed in the cover 56. As such, a user can remove the cover 56 from the container 5 for refilling solution.

Referring to FIG. 2, there is shown a second preferred embodiment of the invention. A cover 14 is fitted on top of the upper channel 10 of the dispenser 1.

5 At least one opening 142 is formed in the cover 14. The provision of the cover 14 on the upper channel 10 aims at decreasing a possibility of dropping foreign objects into the dispenser 1, preventing the bottom opening 12 from being clogged by foreign objects, and facilitating solution in the dispenser 1 to flow out of the bottom opening 12. Moreover, the provision of the opening 142 aims at

10 avoiding the dispenser 1 from being enclosed and thus enabling a free communication with the outside. As such, solution in the dispenser 1 is able to flow out of the bottom opening 12 by its own weight when inside and outside pressures of the dispenser 1 are in equilibrium.

In the second preferred embodiment, a rail 182 is provided longitudinally on

15 an inner wall of the dispenser 1. An inverted U-shaped hoist rope 186 is formed to be slidable on the rail 182. An upper depressible spring detent 184 is provided on an outer surface of the dispenser 1 facing the rail 182 and is coupled to an inner end of the hoist rope 186. A holed member having a plurality of apertures 181 are provided along the rail 182. Each of the apertures 181 is adapted to lock

20 the depressible spring detent 184. In detail, the depressible spring detent 184 is adapted to lock in any one of the apertures 181 while the hoist rope 186 is being pushed vertically along the rail 182. As such, a distance between a top portion of the hoist rope 186 and the connecting cup 16 can be changed. In such a manner, the dispenser 1 is suspended in the vertically disposed tank 3 by means of the

25 hoist rope 186. Also, it is possible of changing a relative positioning of the dispenser 1 in the tank 3 depending on capacity or water level of the tank 3 as well as controlling amount of solution dispensed to the tank 3.

Following is a detailed description of operation about the adjusted hoist rope 186 for fully understanding a position adjustment of the hoist rope 186 in the tank 3 and an amount control of solution dispensed to the tank 3.

The dispenser 1 is proximate a bottom of the tank 3 when the depressible spring detent 184 coupled to the hoist rope 186 is locked at a lowest aperture 181. Hence, water will rise quickly to reach the float 2 during the process of refilling water in the tank 3. As such, the float 2 will engage with the bottom opening 12 in a relatively short period of time to stop solution in the dispenser 1 from flowing out of the bottom opening 12. In this case amount of solution dispensed to the tank 3 is relatively small.

To the contrary, the dispenser 1 is distal from the bottom of the tank 3 when the depressible spring detent 184 coupled to the hoist rope 186 is locked at a topmost aperture 181. Hence, water will rise slowly to reach the float 2 during the process of refilling water in the tank 3. As such, the float 2 will engage with the bottom opening 12 in a relatively long period of time to stop solution in the dispenser 1 from flowing out of the bottom opening 12. In this case amount of solution dispensed to the tank 3 is relatively large.

In either preferred embodiment the float 2 comprises a top round plug 22 facing the bottom opening 12. The round plug 22 is inserted into the bottom opening 12 for stopping up the bottom opening 12 when the float 2 is engaged with the bottom opening 12. As such, the float 2 is able to completely close the bottom opening 12. Moreover, in either preferred embodiment the float 2 further comprises a cylindrical wall 164 between the float 2 and the connecting cup 16. The cylindrical wall 164 is closely proximate the float 2 for defining an up-and-down movement of the float 2 in the cylindrical wall 164 and for enabling the round plug 22 to quickly stop up the bottom opening 12.

Moreover, in either preferred embodiment a bottom of the dispenser 1 is

formed as an arcuate section 11 having a lowest point about at the bottom opening 12. The provision of the arcuate section 11 aims at facilitating solution in the dispenser 1 to flow out of the bottom opening 12 by passing the arcuate section 11.

5 In the second preferred embodiment of the invention a weight 188 is coupled to an outer end of the hoist rope 186. The weight 188 is slidable up-and-down along an outer surface of the tank 3. The provision of the weight 188 aims at accommodating with different thicknesses and inside spaces of various tanks 3. As such, the dispenser 1 is adapted to stably mount in the tank 3 by
10 appropriately selecting a weight 188 coupled to the hoist rope 186.

Referring to FIG. 1 again, in the first preferred embodiment an inner peripheral groove 166 is formed adjacent a top edge of the connecting cup 16. A mating outer peripheral protrusion 13 is formed at a lower portion of the tank 3 slightly higher than the bottom opening 12. As such, it is possible of mounting
15 the float 2 within the cylindrical wall 164 of the connecting cup 16. Next, matingly couple the peripheral groove 166 to the peripheral protrusion 13 for securing the connecting cup 16 to the dispenser 1. Note that the peripheral groove 166 and the peripheral protrusion 13 are releasably secured so that it is possible of
20 detaching the connecting cup 16 from the dispenser 1 when the bottom opening 12 is stopped up. Once the connecting cup 16 is detached from the dispenser 1 a user can clean the bottom opening 12 from outside of the dispenser 1. Next, the user can mount the connecting cup 16 in the dispenser 1 again after cleaning the bottom opening 12. In such a manner, the invention can avoid the dispenser
25 1 from being inoperable because the bottom opening 12 is stopped up. As an end, a prolonged useful life of the dispenser 1 is made possible.

In brief, by configuring as above, the dispenser 1 is adapted to automatically dispense solution to the tank 3 and control amount of solution dispensed to the

tank 3. Most importantly, the dispensed solution can be completely mixed with water in the tank 3 for overcoming the drawbacks of uneven amount of cleaner and deodorant dissolved from the cleaning block and incomplete mixing the same with water as experienced by directly throwing the cleaning block into the
5 toilet tank in the prior art.

While the invention has been described by means of specific embodiments, numerous modifications and variations could be made thereto by those skilled in the art without departing from the scope and spirit of the invention set forth in the claims.